# Waves Equations Worksheet

Level: GCSE / A-Level | Difficulty: Intermediate | Topic: Waves & Optics

Practice the wave equations with 10 problems covering wave speed, frequency, period, and wavelength. Includes full worked answers.

## Equations you will need

| | |
|---|---|
| **v = flambda** | Wave speed = frequency x wavelength |
| **T = 1/f** | Period = 1 / frequency |
| **f = 1/T** | Frequency = 1 / period |

## Symbol key

| Symbol | Quantity | Unit |
|---|---|---|
| v | wave speed | m/s |
| f | frequency | Hz (hertz) |
| lambda | wavelength | m |
| T | period | s |

## Practice problems

1. A wave has frequency 50 Hz and wavelength 4 m. Find its speed.

2. A sound wave travels at 340 m/s with wavelength 2 m. Find the frequency.

3. Find the period of a 25 Hz wave.

4. A water wave has a period of 0.5 s and wavelength 1.2 m. Find its speed.

5. Radio waves travel at 3 x 108 m/s. Find the wavelength of a 100 MHz station.

6. A wave on a string completes 60 oscillations in 4 s. Find the frequency and period.

7. A wave has speed 300 m/s and period 0.01 s. Find the wavelength.

8. Visible red light has wavelength 700 nm. Find its frequency. (c = 3x108 m/s)

**9.** A wave has frequency 200 Hz and travels 50 m in 0.25 s. Find the wavelength.

**10.** Two waves: A has period 0.02 s, B has period 0.05 s. Which has higher frequency?

# Answer key

Full worked solutions for each problem.

1. v = flambda = 50 x 4 = 200 m/s
2. f = v/lambda = 340/2 = 170 Hz
3. T = 1/f = 1/25 = 0.04 s
4. f = 1/0.5 = 2 Hz; v = 2 x 1.2 = 2.4 m/s
5. lambda = v/f = (3x108)/(108) = 3 m
6. f = 15 Hz; T = 0.0667 s
7. f = 100 Hz; lambda = 300/100 = 3 m
8. f = c/lambda = 3x108 / 7x10?7 = 4.29x10¹4 Hz
9. v = 50/0.25 = 200 m/s; lambda = 200/200 = 1 m
10. f_A = 50 Hz; f_B = 20 Hz; A has higher frequency